TOP TEN

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Category: **Airborne** Country: **Greece**

Research Area 2: **Green Mobility & Decarbonisation** Idea Number: **26**

Efficient thermal energy harvesting from an integrated organic thermoelectric generator within a carbon fiber-reinforced polymer composite

Lightweight advanced structural composites such as fibre-reinforced polymers are developed and adapted in many applications related to the transport sector. The reduction of CO2 footprint and a more sustainable life cycle cost analysis are key objectives leading to positive environmental impact. Although fibre-reinforced polymers structural performance is well established, the multifunctionality of these materials is a topic of active research. A huge amount of the energy produced globally is dissipated as waste heat, with the transport sector being the major contributor to this unutilised energy, since only 34% of the fuel's energy ends up as useful energy. A thermoelectric generator which can convert directly thermal energy to electricity can recover significant amounts of this lost energy. A thermoelectric generator is typically used for energy conversion through the Seebeck effect, producing electrical power when subjected to a temperature gradient. Organic-based nanomaterials such as Carbon Nanotubes are being extensively studied due to their desirable properties and their added value when incorporated as filler. In addition, regarding the electrical properties, their intrinsic p-type semiconducting behaviour can be effectively tuned when doped to n-type semiconductor. In this study, an in-plane fully organic thermoelectric generator was integrated within a fibre-reinforced polymer part via an easy and fast printing technique, achieving a high thermoelectric performance of 11.6 μW at ΔT = 100 oC.